

**WASHINGTON STATE DEPARTMENT OF ECOLOGY  
POST OFFICE BOX 47600  
OLYMPIA, WASHINGTON 98504-7600**

**IN THE MATTER OF:**

**ConocoPhillips Company  
Ferndale Refinery  
3901 Unick Road P.O. Box 8  
Ferndale, Washington 98248**

**NO. PSD-00-02 Amendment 5**

**FINAL APPROVAL  
OF PSD APPLICATION**

Pursuant to the United States Environmental Protection Agency (EPA) regulations for the Prevention of Significant Deterioration (PSD) set forth in Title 40, Code of Federal Regulations, Part 52 and regulations set forth in the Washington Administrative Code 173-400-141 and based upon the Notice of Construction Application (NOC) submitted by the ConocoPhillips Company (ConocoPhillips) on November 18, 2004, the additional information submitted on December 22, 2004, and the technical analysis performed by the Department of Ecology (the department), now finds the following:

**FINDINGS:**

1. Amendment 5 is an administrative amendment. Approval Condition 14 was changed from semi-annual to annual testing and Approval Condition 21b was changed to submit testing reports within 30-days of the end of the month. ConocoPhillips requested this amendment because they identified a discrepancy between this approval and the EPA Consent Decree.
2. Amendment 4 is an administrative amendment, extending the compliance date for Approval Condition 7 from December 31, 2006 until June 30, 2007. This compliance date is based upon an EPA Consent Decree. ConocoPhillips requested this amendment because they had difficulty scheduling the on-site construction of this project.
3. Amendment 3 is based upon an increase in throughput from the Fluidized Catalytic Cracking Unit (FCCU) from a nominal 30,000 barrels-per-day to a nominal 35,000 barrels-per-day and an increase of FCCU coke burn rate to 29,000 lb/hr. Although the permit application states that particulate matter (PM) will not exceed the PSD Significant Emission Rate (SER), the facility has not been able to demonstrate compliance with the PM and particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>) emission limits for the FCCU established in NWCAA's Order of Approval to Construct (OAC #733a). Including PM in the permit modification is intended to restrict emissions from the project to below the significance levels for PM and PM<sub>10</sub>, thereby avoiding the requirements of the PSD program for PM and PM<sub>10</sub>. In addition, it was discovered that carbon monoxide

(CO) was incorrectly removed from the permit as part of Amendment 1. CO will be added back into the permit as a result of this action.

4. Amendment 2 was an administrative amendment that changes the company name and simplifies the performance testing requirements in Approval Condition 2. On April 21, 2003, the department was informed that the performance test method specified in Approval Condition 2 limited the source test to one specific testing procedure. The department agreed to change the reference; thus allowing more flexibility in performance testing.
5. Amendment 1 was based upon the application received on January 28, 2002, and determined to be complete on March 14, 2002. The amendment proposes the S Zorb process (licensed by ConocoPhillips) as a replacement for the recently permitted hydrodesulfurizer. In addition to the S Zorb replacement, two heaters (heavy HCC gasoline stripper reboiler and the heavy FCC gasoline HDS feed heater) were combined into one heater (cat gasoline desulfurizer feed heater). Removing the two heaters resulted in emissions of carbon monoxides below the PSD significance rates. Carbon monoxide emissions are no longer contained in this PSD permit. No emission increases were associated with this amendment.
6. The original permit was based upon an application received on April 26, 2000, and determined to be complete on August 8, 2000. Below is a description of the project.
7. New to this permit are Approval Conditions 4, 5, 6, 7, 8, 9, 12, 12, 14, 15, and 16.
8. ConocoPhillips operates an oil refinery in Ferndale, Washington.
9. The original project consisted of two smaller projects. The Ferndale Upgrade Project and the Clean Fuels Project.
10. The Ferndale Upgrade Project consisted of installing a new nominally 30,000 barrels-per-day fluidized catalytic cracking unit (now estimated at 35,000 barrels-per-day), carbon monoxide boiler, and alkylation unit feed treater. The gas plant will also be modified to accommodate the new flow from the fluidized catalytic cracking unit.
11. The Clean Fuels Project involved revamping the existing No. 2 hydrofiner to treat the light straight-run gasoline. Additionally, a new nominally 17,500 barrel-per-day cat gasoline desulfurizer will be constructed to treat fluidized catalytic cracked naphtha, and a new Merox contactor to treat the light fluidized catalytic cracked naphtha.
12. These projects are subject to the following New Source Performance Standards (NSPS); Subpart Db (Standards of Performance or Industrial – Commercial – Institutional Steam Generating Units); and Subpart J (Standards of Performance for Petroleum Refineries).
13. ConocoPhillips is one of the 28 source categories subject to PSD permitting if potential emissions of a criteria pollutant exceed 100 tons per year.

14. ConocoPhillips is a major stationary source that emits more than 100 tons of pollutants per year.
15. Today's project qualifies as a major modification because nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>) have a "significant" emissions increase greater than 40, 100, and 15 tons per year respectively.
16. Even though the emission increase of particulate matter (PM) is below the PSD significant emission rate of 25 tons per year, PM emission limits is included in this permit.
17. The emissions of all other air pollutants from the proposed modification are subject to review under Chapter 173-400 WAC and Chapter 173-460 WAC by the Northwest Clean Air Agency.
18. In the original permit, ConocoPhillips elected to take a federally enforceable limit on the natural gas fired in the CO boiler limiting the boiler to an annual capacity factor of 10% for natural gas. This annual capacity factor will exempt the boiler from the standards for NO<sub>x</sub> emissions under 40 CFR 60.44b(a) and 60.44b(e).
19. Several of the heaters are not able to reach their full capabilities due to undersized burners. Emissions from those units have been calculated below the units rated potential. The limitations are listed in the Appendix A to this permit.
20. Today's project will result in an increase of up to 499.63 tons per year of NO<sub>x</sub>.
21. An ultralow low NO<sub>x</sub> burner has been determined to be Best Available Control Technology (BACT) for the control of NO<sub>x</sub> from the cat gasoline desulfurizer feed heater.
22. Proper operation has been determined to be BACT for the control of NO<sub>x</sub> from the FCCU.
23. Selective Non-Catalytic Reduction has been determined to be BACT for the control of NO<sub>x</sub> from auxiliary firing from the CO boiler.
24. Good operating practices have been selected as BACT for the control of NO<sub>x</sub> from the sulfur recovery unit.
25. The project will result in a net emissions increase of up to 332.4 tons per year of CO.
26. A thermal oxidizer (CO Boiler) has been selected to be BACT for control of CO emissions from the FCCU.

27. Good Combustion Practices has been determined to be BACT for the control of CO from the CO Boiler.
28. Good Combustion Practices has been selected to be BACT for the control of CO emissions from the SRU.
29. The project will result in a net emissions increase of up to 29.54 tons per year of PM<sub>10</sub>.
30. The project will result in a net emissions increase of up to 10.14 tons per year of PM.
31. A wet gas scrubber has been selected to be BACT for controlling PM/PM<sub>10</sub> emissions from the FCCU.
32. The project is located in an area that has been designated Class II for the purposes of PSD evaluation and is located approximately 75 km from the North Cascades National Park and 100 km from the Glacier Peak Wilderness Area, the nearest Class I areas.
33. The project is located in an area that is currently designated in attainment for all national air quality standards and all state air quality standards.
34. The ambient impacts of the proposed increase in emissions associated with Amendment 3 were determined with the EPA's *Industrial Source Complex Prime Model* and *CALPUFF Model* in screening mode.
35. Modeling results show that there will be an increase of NO<sub>x</sub> of approximately 0.09 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (annual average) in the North Cascade National Park due to this project. There is no change in the increase associated with Amendment 1 or Amendment 2.
36. Amendment 3 will have no significant impact on ambient air quality.
37. The project will not have a noticeable effect on industrial, commercial, or residential growth in the Ferndale area.
38. Visibility will not be impaired in any Class 1 area due to the proposed project.
39. Based upon the Technical Support Document dated April 11, 2005, the department finds that all requirements for PSD have been satisfied. Approval of the PSD application is granted subject to the following conditions.

#### **APPROVAL CONDITIONS:**

1. Emissions of NO<sub>x</sub> from the cat gasoline desulfurizer feed heater shall not exceed 17 ppm<sub>dv</sub> at 7% O<sub>2</sub> over a 1-hour averaging period and 5.1 tons per year over a 12-month rolling total. Initial compliance shall be determined in accordance with EPA Reference Method 7E.

2. Combined NO<sub>x</sub> emissions from the FCCU and CO boiler, shall not exceed 127 ppm<sub>dv</sub> at 7% O<sub>2</sub> over a 30-day rolling averaging period and 308.10 tons per year over a 12-month rolling total. If ConocoPhillips is unable to meet the emission limits for NO<sub>x</sub> listed above within 90 days of startup, they must install a selective non-catalytic reduction unit and retest within 150 days of startup.
3. Emissions of NO<sub>x</sub> from the sulfur recovery unit shall not exceed 42.2 ppm<sub>dv</sub> at 7% O<sub>2</sub> over a 1-hour averaging period and 9.88 tons per year. Initial compliance shall be determined by EPA Reference Method 7E.
4. Emissions of carbon monoxide (CO) from the cat gasoline desulfurizer feed heater shall not exceed 0.0824 lb/MMBtu over a 1-hour averaging period and 14.4 tons per year over a 12-month rolling total. Initial compliance shall be determined in accordance with EPA Reference Method 10, 10A or 10B.
5. Combined CO emissions from the FCCU and CO Boiler shall not exceed 500 ppm<sub>dv</sub> @ 0% O<sub>2</sub> over a 1-hour averaging period and 100 ppm<sub>dv</sub> @ 0% O<sub>2</sub> over a 365 day rolling average. Initial compliance shall be determined in accordance EPA Reference Method 10, 10A or 10B.
6. Emissions of CO from the Sulfur Recovery Unit shall not exceed 57.1 ppm<sub>dv</sub> @ 7% O<sub>2</sub> over a 1-hour averaging period and 8.30 tons per year over a 12-month rolling total. Initial compliance shall be determined in accordance with EPA Reference Method 10.
7. By no later than June 30, 2007, combined PM/PM<sub>10</sub> emissions from the FCCU and CO boiler shall not exceed 0.50 lb/1000 lbs coke burn-off over a rolling three-hour average and 0.020 grains per dry standard cubic foot corrected to 7% oxygen over a rolling 3-hour average. Initial compliance shall be determined in accordance with EPA Reference Method 5B.
8. For the period between the time this permit becomes final and the date that ConocoPhillips demonstrates compliance with the emission limits in Approval Condition 7, combined PM/PM<sub>10</sub> emissions from the FCCU and CO boiler shall not exceed 0.80 lb/1000 lb coke burn-off over a rolling three-hour average when operating three scrubber water recirculation pumps and 0.020 grains per dry standard cubic foot corrected to 7% oxygen over a 3-hour rolling average. Initial compliance shall be determined in accordance with EPA Reference Method 5B.
9. For the period between the time this permit becomes final and the date that ConocoPhillips demonstrates compliance with the emission limits in Approval Condition 7, ConocoPhillips will operate all three scrubber water recirculation pumps to the maximum extent practicable, except during pump malfunction or periods of scheduled maintenance of a pump. ConocoPhillips will optimize the operation of the pumps in order to minimize the periods of scheduled maintenance. ConocoPhillips will not schedule maintenance on more than one pump at any given time and scheduled maintenance will not exceed one week. During pump malfunction ConocoPhillips will use best efforts to take all steps necessary (including pump

replacement) to minimize the amount of time the FCCU wet gas scrubber operates with fewer than three pumps.

10. Compliance with Approval Conditions 1 and 3 will be monitored by yearly source testing in accordance with EPA Reference Method 7E as found in 40 C.F.R. Part 60, Appendix A or an alternative approved method. Source testing shall be performed no sooner than 10-months after the previous test and no later than 13-months after the previous test.
11. Compliance with Approval Condition 2 will be monitored by a continuous emission monitor for NO<sub>x</sub> meeting the performance specifications of 40 C.F.R. Part 60, Appendix B and quality control/quality assurance requirements of 40 C.F.R. Part 60, Appendix F. The continuous emission monitor must be installed and certified within 180 days after startup.
12. Compliance with Approval Condition 5 will be demonstrated by a Continuous Emission Monitor for carbon monoxide meeting the performance specifications of 40 C.F.R. Part 60, Appendix B and quality control/quality assurance requirements of 40 C.F.R. Part 60, Appendix F.
13. Compliance with Approval Condition 4 and 6 will be demonstrated by yearly source testing in accordance with EPA Reference Method 10, as found in 40 C.F.R. Part 60, Appendix A or an alternative approved method. ConocoPhillips will identify a surrogate parameter (such as fuel usage) and multiply it by the emission factor derived during the previous source test. Source testing shall be performed no sooner than 4-months after the previous test and no later than 8-months after the previous test.
14. Compliance with Approval Condition 7 will be demonstrated by annual source testing in accordance with EPA Reference Method 5B, as found in 40 C.F.R. Part 60, Appendix A or an alternative approved method. Source testing shall be performed no sooner than 4-months after the previous test and no later than 8-months after the previous test. Source testing shall be performed at maximum normal FCCU feed rates.
15. Compliance with Approval Condition 8 will be determined by semi-annual source testing in accordance with 40 CFR 60 Appendix A Method 5B. Source testing shall be performed no sooner than 4-months after the previous test and no later than 8-months after the previous test. Source testing shall be performed at maximum normal FCCU feed rates.
16. Compliance with Approval Condition 9 will be met by recordkeeping.
17. Within 90 days of startup, ConocoPhillips shall conduct performance test for NO<sub>x</sub> emissions from the cat gasoline desulfurizer feed heater, combined emissions from the FCCU and CO boiler and the sulfur recovery unit, conducted by an independent testing firm. A test plan shall be submitted to the department for approval at least 30-days prior to testing. The term startup is defined by 40 C.F.R. 60.2.
18. Use of natural gas shall be limited to 10% of fuel combusted in the CO boiler or 111,252 MMBtu/yr, over a calendar year averaging period.

19. The maximum firing rate of the cat gasoline desulfurizer feed heater, FCC combustion air heater, cat gasoline desulfurizer feed heater, CO boiler, and sulfur recover unit shall be limited to the values listed in Appendix A.
20. Within 90 days of initial start-up of the boiler, ConocoPhillips shall identify boiler operational parameters and practices that have been described as "good combustion practice." These operational parameters and practices shall be included in an operation and maintenance (O&M) manual for the boiler. The O&M manual shall also include a description of records that will be maintained to insure the continuous application of "good combustion practice." The O&M manual shall be maintained by ConocoPhillips and be available for review by state, federal, and local agencies. Emissions that result from a failure to follow the requirements of the O&M manual may be considered credible evidence that emission violations have occurred.
21. ConocoPhillips shall report the following monitoring data to the Northwest Clean Air Agency and the department. It will no longer be necessary to report to the department when PSD compliance and enforcement delegated Northwest Clean Air Agency or once the Northwest Clean Air Agency has issued a Title V permit.
  - a) Submit the performance test data from the initial performance test and the performance evaluation of the continuous emission monitor's using the applicable performance specifications in 40 C.F.R. Appendix B.
  - b) Submit a report within 30 days of the end of each calendar month, or on another approved reporting schedule, and in the format approved by the department, including the following:
    - 1) Calendar date,
    - 2) average  $\text{NO}_x$ , CO, and  $\text{PM}/\text{PM}_{10}$  emission rates from the FCC / CO Boiler wet gas scrubber,
    - 3) identification of any steam generating days for which  $\text{NO}_x$  data were not obtained, including reasons for not obtaining sufficient data and description of corrective actions taken,
    - 4) identification of times emission data are excluded from the calculated average emission rate and the reasons for excluding the data, and
    - 5) wet scrubber pump operation and maintenance records pursuant to Approval Condition 9 until ConocoPhillips demonstrates compliance with the limits in Approval Condition 7.
  - c) Submittal of monthly reports satisfies the quarterly reporting requirements of 40 C.F.R. 60.49b, except that ConocoPhillips shall submit a quarterly report, within 30 days after the end of each calendar quarter, including the following continuous emission monitor test data:
    - 1) Days for which data was not collected,

- 2) reasons for which data was not collected,
- 3) identification of times when the pollutant concentration exceeds span of the continuous emission monitor,
- 4) description of any modifications to the continuous emission monitor system that could affect the ability of the system to comply with performance specifications 2 or 3, and
- 5) results of any continuous emission monitor drift tests.

d) In addition, ConocoPhillips shall maintain monitoring records on site for at least five years, and shall submit:

- 1) Excess emission reports to the department and the Northwest Clean Air Agency, as appropriate, and
- 2) results of any compliance source tests.

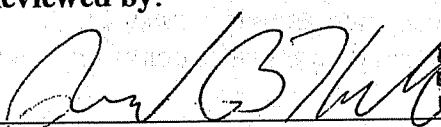
22. Any activity, which is undertaken by the company or others, in a manner, which is inconsistent with the application and this determination, shall be subject to enforcement under the applicable regulations.

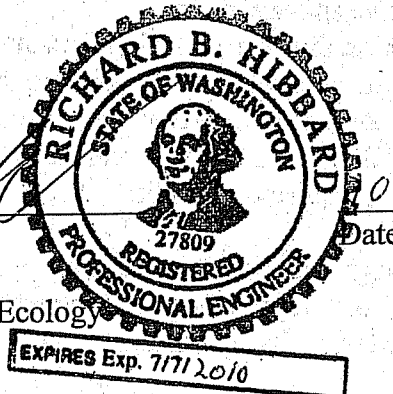
23. Access to the source by the EPA, state, and local regulatory personnel shall be permitted upon request for the purposes of compliance assurance inspections. Failure to allow such access is grounds for an enforcement action.

24. This approval shall become invalid if construction of the project is not commenced within eighteen (18) months after receipt of the final approval, or if construction of the facility is discontinued for a period of eighteen (18) months, unless the department extends the 18 month period upon satisfactorily showing that an extension is justified, pursuant to 40 C.F.R. 52.21(r)(2) and applicable EPA guidance.

25. Final approval of this permit shall not be earlier than the date upon which the EPA notified Ecology that the EPA has satisfied its obligations, if any, under Section 7 of the Endangered Species Act 16 U.S.C. § 1531 et seq., 50 C.F.R. part 402, Subpart B (Consultation Procedures) and Section 305(b)(2) of the Magnuson-Stevens Fishery and Conservation Act 16 U.S.C. § 1801 et seq., 50 CFR Part 600 Subpart K (EFH Coordination, Consultation, and Recommendations).

Reviewed by:

  
Richard B. Hibbard, P.E.  
Technical Services Section  
Washington State Department of Ecology

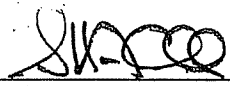


Date

10/21/08



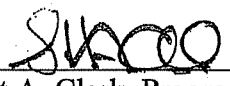
**Approved by:**

  
\_\_\_\_\_  
Stuart A. Clark, Program Manager  
Air Quality Program  
Washington State Department of Ecology

10/23/08  
Date

Ecology was notified by EPA that the EPA has satisfied its obligations under the Endangered Species and Magnuson-Stevens Act on:

4/11/05  
Date of EPA Notification

  
\_\_\_\_\_  
Stuart A. Clark, Program Manager  
Air Quality Program  
Washington State Department of Ecology

## APPENDIX A

Unit	WEDS ID #	Maximum firing Rate (MMBtu/hr) unless otherwise noted
Sulfur Recovery Unit	17	23
Cat Gasoline Desulfurizer Feed Heater	A	40
FCC Combustion Air Heater	C	70
CO Boiler	E	109*

\* Applies when auxiliary firing fuel gas.

## APPENDIX B

Emission limits:

Emissions	Cat Gas Desulfurizer Feed Heater	FCCU & CO Boiler	SRU
NO <sub>x</sub>	17 ppmdv & 5.1 tpy	127 ppmdv & 308.10 tpy	42.2 ppmdv & 9.88 tpy
CO	0.0842 lb/MMBtu & 14.4 tpy	500 ppmdv (1-hour) 100 ppmdv (365-day)	57.1 ppmdv & 8.3 tpy
PM <sub>10</sub>	-	0.50 lb/1000 lb coke burned**	-

\*\*As per Consent Decree, 0.8 lb/1,000 lb will be the emission standard between January 27, 2005 and the date that COPC demonstrates compliance with the 0.50 lb/1,000 lb coke burned, but no later than June 30, 2007.

